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Claims

I Claim:

- 5 1. A DC-DC converter that converts a first DC voltage to a second DC voltage comprising:
a first switch connected to an input of the first DC voltage;
a second switch, wherein the first and second switches
10 are controlled by an input signal to generate the second DC voltage;
a sensing device for sensing a current level difference in the second switch; and
a control circuit to control delay of the input signal
15 by monitoring the current level difference.
2. The DC-DC converter of claim 1, wherein the control circuit controls a delay circuit.
- 20 3. The DC-DC converter of claim 2, wherein the delay circuit comprises a charge controlled delay circuit.
4. The DC-DC converter of claim 2, wherein the delay circuit comprises a digital controlled delay circuit.
- 25 5. The DC-DC converter of claim 1, wherein the sensing device comprises a MOSFET device.
6. The DC-DC converter of claim 1, wherein the second
30 switch comprises a power MOSFET device.
7. The DC-DC converter of claim 6, wherein the sensing device senses current conduction of the body diode.

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8. A synchronous DC-DC converter structure comprising:
a high-side MOSFET switch having a drain coupled to an input DC voltage and a source coupled to a switch node;
a low-side MOSFET switch having a drain coupled to the
5 switch node and a drain coupled to a ground node;
a sensing device having a drain coupled to the switch node for sensing current in the low side MOSFET switch; and
a control structure coupled to the sensing device for monitoring a sensed current difference and adjusting a delay
10 time for turning on one of the high-side MOSFET switch and the low-side MOSFET switch.
9. The structure of claim 8, wherein the control structure is coupled to an adjustable delay circuit that increases and
15 decreases the delay time.
10. The structure of claim 9 wherein the adjustable delay circuit comprises a DCD circuit.
- 20 11. The structure of claim 9 wherein the delay circuit comprises a CCD circuit.
12. The structure of claim 8, wherein the sensing device comprises a MOSFET device.
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13. The structure of claim 8, wherein the sensing device senses body diode current conduction in the low-side MOSFET switch.
- 30 14. The structure of claim 8, wherein the sensing device senses cross conduction current in the low-side MOSFET switch.

15. A method for controlling delay time in a synchronous DC-DC converter having a high-side switch coupled to a low-side switch comprising the steps of:
- 5 sensing a current level difference in the low-side switch; and
- controlling a delay time in turning on one of the high-side switch and the low-side switch using the current level difference.
- 10 16. The method of claim 15 wherein the step of controlling the delay time includes increasing the delay time.
17. The method of claim 15 wherein the step of controlling the delay time includes decreasing the delay time.
- 15 18. The method of claim 15 wherein the step of sensing the current level difference includes sensing current in the low-side switch with a MOSFET device and comparing a first current level to a second current level to generate the
- 20 current level difference.
19. The method of claim 15, wherein the step of controlling the delay time includes controlling the delay time with a DCD circuit.
- 25 20. The method of claim 15, wherein the step of controlling the delay time includes controlling the delay time with a CCD circuit.